

December 21, 2000

Mr. Thomas J. Palmisano  
Site Vice President and General Manager  
Palisades Nuclear Generating Plant  
Consumers Energy Company  
27780 Blue Star Memorial Highway  
Covert, MI 49043-9530

SUBJECT: PALISADES NRC INSPECTION REPORT 72-0007/2000-002(DNMS)

Dear Mr. Palmisano:

On December 8, 2000, the NRC completed an inspection at your Palisades Nuclear Generating Plant. The purpose of the inspection was to review the preliminary operability assessment regarding the discovery that eleven fuel assemblies had been loaded into five VSC-24 spent fuel storage casks before the required five year cooling time. The enclosed report presents the results of that inspection. No violations of NRC requirements were identified.

Some issues relating to the premature loading require further NRC inspection. Pending the additional inspection, these matters are being classified as an Unresolved Item.

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We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA/

Bruce L. Jorgensen, Chief  
Decommissioning Branch

Docket No. 72-0007

Enclosure: Inspection Report 72-0007/200-002(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 72-0007

Report No: 72-0007/2000002(DNMS)

Licensee: Consumers Energy Company

Facility: Palisades Nuclear Generating Plant

Location: 27780 Blue Star Memorial Highway  
Covert, MI 49043-9530

Dates: December 7 - 8, 2000

Inspector: R. B. Landsman, Project Engineer

Approved by: Bruce L. Jorgensen, Chief  
Decommissioning Branch  
Division of Nuclear Materials Safety

## **EXECUTIVE SUMMARY**

### **Palisades Nuclear Generating Plant NRC Inspection Report 72-0007/200002(DNMS)**

This was a special inspection to review the preliminary operability assessment regarding the discovery of eleven fuel assemblies loaded into five at Palisades spent fuel storage casks before the Certificate of Compliance-required five year cooling time. Overall, the preliminary assessment determined that there is no safety issue with continuing to store these assemblies in the casks. There has been no apparent impact on occupational dose, and all surveillance parameters are within specifications. Based on the preliminary assessment, the design of the heat load for the casks appears to bound the as found condition. Some issues require additional NRC inspection and are currently being classified as an Unresolved Item.

## Report Details

### **1.0 Cask Operability Review**

#### **a. Inspection Scope (60855)**

The inspector reviewed the licensee's preliminary operability determination relating to the storage of eleven spent fuel assemblies in five VSC-24 storage casks when the assemblies did not have the Certificate of Compliance (C of C) required five year cooling time.

#### **b. Observation and Findings**

The inspector reviewed Palisades' operability assessment CPAL0003363, which documented the assessment of the storage of these assemblies in Palisades VSC-24 casks. These assemblies were loaded during the summer of 1999 loading campaign of five dry fuel storage casks at Palisades. Eleven fuel assemblies were loaded which did not meet the C of C. In particular, these eleven assemblies did not meet the criteria for Post Irradiation Time ( $\geq 5$  years) specified in Table 1 of the C of C. Other C of C criteria were also potentially affected by this error, most notably, the limiting decay heat load per assembly of  $\leq 1$  kilowatt (kw).

The eleven prematurely loaded assemblies were all from reactor cycle 8 reload L, initially loaded into the core in 1988. These eleven were part of a group of sixteen reload L bundles which were reconfigured at the end of cycle 10, during 1993, to contain stainless steel rods at the corners. They were then reinserted in the core for use during cycle 11, which ended on May 22, 1995. Thus, at the time they were placed into casks in 1999, they had only slightly more than four years of cooling time. This was discovered in November 2000 while Palisades was working on reviews relating to NRC Information Notice 99-029 and Interim Staff Guidance ISG-9. These documents alerted licensees to review fuel loaded into spent fuel casks for contents not authorized by the cask's C of C. The start of this review was documented in Inspection Report 72-0007/2000-001.

The assemblies were dispersed among the five casks with no more than three assemblies per cask.

- **Heat Load**

The VSC-24 casks are designed to provide cooling via natural convection to maintain acceptably low fuel cladding temperatures. Monitoring of the casks showed temperatures of the cask concrete and steel never exceeded the C of C delta of  $110^{\circ}\text{F}$ . Most were less than  $50^{\circ}\text{F}$ . This indicates that the concrete and steel were not challenged due to the increased heat load. The inspector calculated the average heat generation rate of the assemblies surrounding these eleven assemblies to be  $\leq 0.69$  kw/assembly. The presence of these cooler assemblies compensated for the increase in heat load due to the L assemblies, which at a maximum was 1.2 kw/assembly. Preliminary licensee assessments indicated that 8 of the 11 prematurely loaded assemblies were actually below 1.0 kw at the time of loading. More detailed analyses are underway to precisely determine the heat load of the remaining three assemblies at the time of loading into the casks. The inspector also noted that the maximum heat load for any involved cask was less

than 16 kw at the time of loading. This is well below the design basis heat load of 24 kw. It appears likely that the design bounds the steady-state heat load of these five casks. Thus, fuel cladding temperatures did not reach sustained high levels which could cause cladding damage.

- Radiation and Shielding

The VSC-24 casks are also designed to limit external dose rate. The inspector reviewed dose rate measurements and found they never exceeded the C of C requirements of < than 50 mrem/hr on the top or at the vents. Doses were nominally less than 40 mrem/hr. The specification was < 20 mrem/hr on the sides, and actual doses were normally 2.9 mrem/hr or less. There appeared to be no impact on occupational dose and all surveillance parameters were within specifications, supporting a conclusion that the cask system is performing its designed shielding function.

- Apparent Cause

The error in the fuel selection apparently occurred because the engineer erroneously treated all reload L bundles as a group which he categorized as being discharged in 1993. Sixteen reload L bundles were actually in the core until 1995. It appears to be a case of inadequate self verification, which was subsequently not identified in the technical review. The error did not appear due to erroneous fuel records, but because of an error in the use of the records. The licensee did not have detailed procedures which controlled how these records would be used. A review of other fuel-related data, such as burn-up, enrichment and assembly weight indicated that the only error which occurred related to the post-irradiation time.

- Additional Reviews

The licensee is presently performing a comprehensive assessment of the past operability, including decay power per assembly, gamma and neutron source strength and spectrum. They are also comparing their selection process to industry practices.

c. Conclusion

The operability assessment was well done and established that there is no current safety issue with continuing to store the subject eleven assemblies in the casks at Palisades. Placement of these assemblies into the casks in 1999 was contrary to the C of C. Pending further NRC review of the licensee's investigation to evaluate potential significance, validate the root cause and determine final corrective action, these matters are being classified as an unresolved item: URI 72-0007/2000-002(DNMS).

## **2.0 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management during an interim briefing on December 8, 2000. The licensee acknowledged the findings presented. The licensee did not identify any information discussed as being proprietary.

### **PARTIAL LIST OF PERSONS CONTACTED**

J. Broschak, Program Manager - Dry Fuel  
N. Haskell, Director of Licensing and Performance Assessment  
D. Cooper, Plant General Manager  
G. Baustion, Manager, Nuclear Engineering  
D. Malone, Director of Engineering

### **INSPECTION PROCEDURES USED**

IP 60855: Operation of an Independent Spent Fuel Storage Installation

### **LIST OF DOCUMENTS REVIEWED**

The licensee documents reviewed and utilized during the course of this inspection are specifically identified in the "Report Details" above.